UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Decision Rationale

For the Shellfish Harvest Impairment TMDLs in the Greenvale Creek, Lancaster Creek and Farnham Creek Watersheds, Lancaster and Richmond Counties, Virginia

Signed

Jon M. Capacasa, Director
Water Protection Division

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Decision Rationale

Total Maximum Daily Load for
Shellfish Impairments in the Greenvale Creek, Lancaster Creek and
Farnham Creek Watersheds, Lancaster and Richmond Counties, Virginia

I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) be developed for those water bodies identified as impaired by a state where technology-based and other controls will not provide for attainment of water quality standards. A TMDL is a determination of the amount of a pollutant from point, nonpoint, and natural background sources, including a margin of safety (MOS), that may be discharged to a water quality-limited waterbody.

This document will set forth the U.S. Environmental Protection Agency's (EPA) rationale for approving the TMDLs for the shellfish harvesting (bacteriological) impairments in the Greenvale Creek, Lancaster Creek and Farnham Creek Watersheds. EPA's rationale is based on the determination that these TMDLs meet the following eight regulatory conditions pursuant to 40 CFR §130.

1. The TMDLs are designed to implement applicable water quality standards.
2. The TMDLs include a total allowable load as well as individual waste load allocations (WLAs) and load allocations (LAs).
3. The TMDLs consider the impacts of background pollutant contributions.
4. The TMDLs consider critical environmental conditions.
5. The TMDLs consider seasonal environmental variations.
6. The TMDLs include a MOS.
7. There is reasonable assurance that the TMDLs can be met.
8. The TMDLs have been subject to public participation.

II. Background

All of these watersheds discharge to the Chesapeake Bay. Table 1 documents the three major landuses and total acreage for each of the watersheds.

Table #1 – Watershed Landuses

Watershed	Area (sq. miles)	Percent Forest	Percent Agriculture	Percent Water/Wetland
Greenvale Creek	9.5	49	38	8
Lancaster Creek	34.4	63	21	12
Farnham Creek	21.3	61	33	6

In response to Section 303(d) of the CWA, the Virginia Department of Environmental Quality (VADEQ) listed waters within the Greenvale Creek, Lancaster Creek and Farnham Creek Watersheds as impaired on Virginia's 1998 Section 303(d) list for being unable to attain the production of edible and marketable natural resources use due to elevated levels of fecal coliform bacteria. The criteria are in place to protect the public from health affects associated with the consumption of bacteriologically contaminated shellfish.

The impairment is based on restrictions placed upon the harvesting of shellfish from these waters. The restrictions which are issued by the Virginia Department of Health's Division of Shellfish Sanitation (DSS) are based on monthly monitoring data. DSS collects monthly fecal coliform bacteria samples from each of its sampling stations in the watersheds. DSS calculates geometric mean and 90th percentile concentration values based on the most recent 30-months of sampling data. The criteria calls for a 30-month geometric mean concentration of less than 14 most probable number (mpn)/100 millimeters (ml) and a 90th percentile concentration, based on the same 30-months of data below 49 mpn/100 ml. The criterion is identical to criteria developed under the National Shellfish Sanitation Program which is regulated by the U.S. Food and Drug Administration. Most of the stations were listed for failing to attain the 90th percentile criteria. Table 2 identifies the TMDL loadings for the impaired waters.

Table #2 - TMDL Loadings

Watershed	Water	Segment/ Condemnation	TMDL (mpn/day)	LA (mpn/day)	MOS
Greenvale Creek	Greenvale Creek	VAP-E25E-15/ 95	4.28E+10	4.28E+10	Implicit
	Beach Creek	VAP-E25E-14/ 116	2.52E+10	2.52E+10	Implicit
Lancaster Creek	Lancaster Creek	VAP-E25E-11/ 120A	1.76E+11	1.76E+11	Implicit
	Mulberry Creek	VAP-E25E-13/ 120B	9.38E+10	9.38E+10	Implicit
	Deep Creek	VAP-E25E-10/ 121	2.06E+10	2.06E+10	Implicit
Farnham Creek	Farnham Creek	VAP-E25E-05/ 070	1.73E+11	1.73E+11	Implicit

III. Discussion of Regulatory Conditions

EPA finds that Virginia has provided sufficient information to meet all of the eight basic regulatory requirements for establishing shellfish harvesting use impairment TMDLs for the impaired waters. EPA is therefore approving these TMDLs. EPA's approval is outlined according to the regulatory requirements listed below.

1) The TMDLs are designed to meet the applicable water quality standards.

The waters were listed as impaired due to restrictions placed on the harvesting of shellfish as a result of excessive concentrations of fecal coliform bacteria in the water column. Virginia developed these TMDLs to insure that they would meet the applicable criteria of a 30-

month geometric mean of 14 mpn/100ml and a 90th percentile of 49 mpn/100 ml. Most of the DSS monitoring stations within the impaired waters were unable to attain the 90th percentile criteria. The TMDLs were modeled by the Commonwealth using a volumetric load approach.

The Commonwealth collected approximately 12-months of bacterial source tracking (BST) and fecal coliform data from the impaired areas. The BST data was collected from multiple monitoring stations within each impaired segment to determine the sources of fecal coliform to the watershed. The sources were broken down into four categories; human, pets, livestock and wildlife. An average percent loading per source category was obtained by summing the monthly percent concentrations and dividing that summation by 12. The Commonwealth then determined the current 30-month geometric mean and 90th percentile concentrations for each condemned area. This data was combined with the previously described BST data. Waters in which data was collected from multiple stations within a condemned area had the data volume weighted. The existing load was determined for each criterion by multiplying the existing 90th percentile and geometric mean concentrations by the impaired water volume. The allowable load was determined by multiplying the criterion by the volume of the impaired water. The required reductions were determined by subtracting the allowable load from the existing load. The 90th percentile concentration was the more stringent criteria and was used for all the TMDLs.

2) The TMDLs include a total allowable load as well as individual waste load allocations and load allocations.

Total Allowable Loads

Virginia indicates that the total allowable loading is the loading derived by multiplying the more stringent criteria by the volume of water. The total allowable loading contains the sum of the loads allocated to land based precipitation driven nonpoint source areas (developed and agricultural land segments) and point sources. Activities that increase the levels of fecal coliform to the land surface or their availability to runoff are considered flux sources. The actual value for total loading can be found in Table 2 of this document. The total allowable load is calculated on a daily basis.

Waste Load Allocations

EPA regulations require that an approvable TMDL include individual WLAs for each point source. According to 40 CFR § 122.44(d)(1)(vii)(B), "Effluent limits developed to protect a narrative water quality criterion, a numeric water quality criterion, or both, are consistent with assumptions and requirements of any available WLA for the discharge prepared by the state and approved by EPA pursuant to 40 CFR § 130.7." Furthermore, EPA has authority to object to the issuance of any National Pollutant Discharge Elimination System (NPDES) permit that is inconsistent with the WLAs established for that point source.

There are permitted dischargers of bacteria outside of the condemned areas for which the TMDLs were developed. DSS places a prohibition on the harvest of shellfish from areas around certain permitted dischargers where the bacteria concentrations are predicted to be above 88

mpn/100 ml. This prohibition makes the harvest of shellfish from these areas illegal. The aerial extent of the prohibition extends to where the predicted bacteria concentrations are above three mpn/100 ml. Based on this information, the point sources were not expected to impact the condemned area which occurs outside of the prohibited area and the condemned areas were modeled as stand alone units. Therefore, no WLAs were provided in these TMDLs as there were no point sources within the modeled units. This information was obtained from an August 08, 2005 letter from DSS to VADEQ.

Load Allocations

According to Federal regulations at 40 CFR § 130.2(g), LAs are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting loading. Wherever possible, natural and nonpoint source loads should be distinguished.

LAs were developed for each of the four fecal coliform source categories (human, pets, livestock and wildlife). The loadings were not developed on landuses. The implementation techniques needed to insure compliance with the TMDL will be applied to the landuse for the applicable sources. Table 3 documents the LAs for each source category of fecal coliform bacteria.

Table 3- Load Allocations by Source

Segment	Human (mpn/day)	Pets (mpn/day)	Livestock (mpn/day)	Wildlife (mpn/day)	Overall Percent Reduction
Greenvale Creek	0.00	0.00	0.00	4.28E+10	81
Beach Creek	1.23E+08	6.42E+09	3.80E+09	1.49E+10	14
Lancaster Creek	0.00	0.00	0.00	1.76E+11	76
Mulberry Creek	0.00	3.00E+10	3.04E+09	6.07E+10	63
Deep Creek	0.00	0.00	0.00	2.06E+10	78
Farnham Creek	2.35E+09	4.03E+09	1.45E+09	1.65E+11	85

3) The TMDLs consider the impacts of background pollution.

Background pollutant contributions were considered in the TMDL development process by quantifying the fecal coliform loads from wildlife sources through the use of BST data.

4) The TMDLs consider critical environmental conditions.

According to the EPA regulation 40 CFR § 130.7 (c)(1), TMDLs are required to take into account critical conditions for stream flow, loading, and water quality parameters. The intent of this requirement is to ensure that the water quality of impaired waters is protected during times when it is most vulnerable.

Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards[1]. Critical conditions are a combination of environmental factors (e.g., flow, temperature, etc.), which have an acceptably low frequency of occurrence. In specifying critical conditions in the waterbody, an attempt is made to use a reasonable "worst-case" scenario condition. For example, stream analysis often uses a low-flow (7Q10) design condition because the ability of the waterbody to assimilate pollutants without exhibiting adverse impacts is at a minimum. These critical conditions ensure that water quality standards will be met for other than worst case scenarios. By quantifying the TMDL load reductions to the more stringent criteria and evaluating a 30-month data period, the TMDLs are insuring that the standards are maintained during critical conditions.

5) The TMDLs consider seasonal environmental variations.

Seasonal variations involve changes in stream flow as a result of hydrologic and climatological patterns. In the continental United States, seasonally high flows normally occur in early spring from snow melt and spring rain, while seasonally low flows typically occur during the warmer summer and early fall drought periods. Source loadings were investigated on a monthly basis to determine if seasonality existed, based on the results it was determined that there were minimal seasonal impacts to loading and the source loads were averaged on an annual basis.

6) The TMDLs include a margin of safety.

This requirement is intended to add a level of safety to the modeling process to account for any uncertainty. The MOS may be implicit, built into the modeling process by using conservative modeling assumptions, or explicit, taken as a percentage of the WLA, LA, or TMDL. Virginia included an implicit MOS in the TMDLs for the impaired waters by targeting reductions to the highest level at which observed concentrations exceeded the water quality standard. The Commonwealth intends to eliminate all human loadings to the impaired waters even if these reductions are not needed.

7) There is a reasonable assurance that the TMDLs can be met.

EPA requires that there be a reasonable assurance that the TMDL can be implemented. WLAs will be implemented through the NPDES permit process. According to 40 CFR § 122.44(d)(1)(vii)(B), the effluent limitations for an NPDES permit must be consistent with the assumptions and requirements of any available WLA for the discharge prepared by the state and approved by EPA. Furthermore, EPA has authority to object to issuance of an NPDES permit that is inconsistent with WLAs established for that point source.

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[1]EPA memorandum regarding EPA Actions to Support High Quality TMDLs from Robert H. Wayland III, Director, Office of Wetlands, Oceans, and Watersheds to the Regional Management Division Directors, August 9, 1999.

Nonpoint source controls to achieve LAs can be implemented through a number of existing programs such as Section 319 of the CWA, commonly referred to as the Nonpoint Source Program.

8) The TMDLs have been subject to public participation.

Two public meetings were held for each of these TMDLs. The meetings were noticed in the Virginia Register and the TMDLs were subjected to a 30-day comment period. DEQ responded to any comments submitted by the public. Table 4 documents the dates of the public meetings for each TMDL.

Table 4 – Public Meeting Dates

Watershed	1st Public Meeting	2nd Public Meeting
Greenvale Creek	January 05, 2006	February 13, 2006
Lancaster Creek	January 05, 2006	February 13, 2006
Farnham Creek	December 12, 2005	February 14, 2006